Ministry of
Transportation and
Communications

Ontario

MI-59

HOW TO ACHIEVE A GOOD PRIMING JOB

MATERIALS INFORMATION
ENGINEERING MATERIALS OFFICE

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS

HOW TO ACHIEVE A GOOD PRIMING JOB

By
J. A. Cooper and R. Aquin

Additional copies may be obtained by writing to:

Ministry of Transportation and Communications
Engineering Materials Office
Bituminous Section
Central Building, Room 317
1201 Wilson Avenue
Downsview, Ontario
M3M 1J8

(416) 248-3688

Materials Information Report No. 59

January, 1984

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1.0 INTRODUCTION

Durable, economical surface treatments begin with a good road base. Priming is part of the road base and is the first step in the surface treatment procedure. This guide explains the necessary steps to achieve a good priming job.

1.1 Definition

Priming is the process where a low viscosity liquid asphalt or emulsified asphalt primer (EAP) is sprayed on a prepared granular base.

Priming accomplishes the following:

1. Waterproofs the surface of the base.
2. Plugs the voids.
3. Coats and bonds loose aggregate.
4. Hardens and toughens the road surface.
5. Acts as a tack coat between the base and the surface treatment.

2.0 MATERIALS

Granular bases are primed with low viscosity liquid asphalts, such as MTC Primer and RC-30 or with EAP. A liquid asphalt is a blend of petroleum solvent and asphalt cement in equal proportions. EAP is similar to primer except that water is substituted for some of the petroleum solvent. The solvent carries the asphalt cement down into the granular base to a depth of ±12 mm, and then the solvent evaporates (cures) over the next 4 - 5 days leaving the asphalt cement. The requirements for liquid asphalts and EAP are found in MTC Specification 1102.

Class 4 Aggregate[1] is applied over the primer to blot the primer and to permit the passage of traffic. Class 4 Aggregate is a fine aggregate with 100% passing the 9.5 mm sieve down to a maximum of 7% passing the 75 um sieve.

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[1]Class 4 Aggregate is referred to as sand cover in MTC Form 302, dated March 1982.

3.0 EXAMINATION OF THE EXISTING ROAD

A thorough examination of the existing granular base should be made several months in advance of priming to determine the necessary repairs.

The road to be primed should be examined for deficiencies such as improper drainage, unsuitable material, and insufficient granular depths.

3.1 Lack of Proper Drainage

Inspect the road for areas with no/or inadequate ditches. Also look for areas with saturated bases.

3.2 Unsuitable Material

Unsuitable materials such as topsoil, silt, silty clays and sands and varved clays within the frost penetration depth (1.0 - 3.2 m) can lead to the failure of a road. The most severe time for a road base is during the spring thaw. Inspect the road during the spring thaw, for frost heaves, frost boils and loss of subgrade support. Loss of subgrade support, is a general weakening of the subgrade and can be identified by long soft rutted sections.

Mark the location of problem areas by driving markers at fence line so that these areas can be easily located in the summer.

3.3 Insufficient Granular Depths

Granular base and subbase provide load bearing capacity and minimize the effects of frost action. Check for sufficient granular depths by inspecting the road during the spring thaw, looking for frost heaves and soft sections. Identify these sections for correction later. If there's doubt about the granular depth, small test holes should be dug to check the depths.

4.0 REPAIRING THE EXISTING ROAD

Each of the problems identified above must be repaired well in advance of priming.

4.1 Providing Drainage

Ditches should be constructed so that they are 0.5 m below subgrade elevation to prevent ponding of water in the granular base. The granular base should be shaped with a minimum of 2% cross fall.

4.2 Removal of Unsuitable Material

The deficient areas identified above, containing unsuitable material should be excavated and backfilled with suitable material in layers not greater than 20 cm. Each layer should be shaped and compacted.

The excavations should not be deeper than the ditches and should be sloped so that they do not trap water.

4.3 Adding Granular Material

Additional granular should be added to thin areas and the imported granular should be shaped to the specified cross-section and profile and compacted to the required density. Water should be used to aid compaction and care should be taken to ensure that the shoulders as well are adequately compacted.

Granular depths are determined by the anticipated traffic loads (especially trucks) and the type of subgrade material. Granular depths must be sufficient to carry the anticipated traffic loads.

Calcium chloride should not be used for dust control or compaction in the same summer that the granular base is to be primed.

5.0 PREPARATION FOR CONSTRUCTION

5.1 Weather

Priming should always be carried out in good weather. The air temperature at the work location should not be less than $10^{0}C$. Priming should not be carried out when the road base is wet, when there is high humidity or immence of rain. Primer sprayed under unfavourable conditions takes longer to cure and is more easily damaged by traffic or in the event of a heavy rain, uncured primer can be washed away resulting in a total loss. Fall work should be avoided and all priming work should be completed by September 1.

5.2 Granular Base Preparation

The granular base must be graded to the bottom of the potholes. Restore the cross-fall (minimum of 2%) and the profile. Future riding qualities of the road depends entirely on the grader operator's skill when restoring the profile.

Better results will be obtained if the granular base is damp at the time of priming. It is recommended that the granular base be dampened with a water truck when required. The granular base should then be rolled with a steel-tired roller. The grading and rolling operation should be completed about 1 km ahead to the priming operation. Preparing the grade too far ahead of the priming operation allows traffic to develop potholes which is undesirable. Too little grade prepared ahead of the priming operation results in delay. Co-ordination between grade preparation and the priming operation is essential.

5.3 Repairing and Sweeping Bituminous Surfaces

Existing primed surfaces may be reprimed to renew the pavement. Rough sections should be graded and returned to granular to restore cross section and profile. Sections in good condition need only to be broomed lightly before priming.

5.4 Approval of Class 4 Aggregate

The Class 4 Aggregate[1] to be used to cover the primer should be approved before work begins. Testing of the aggregate for gradation and physical requirements require approximately three weeks. Sufficient aggregate to complete the project should be stockpiled in advance.

5.5 Selection and Approval of Liquid Asphalt Primer and EAP[2]

The type of primer used depends on the construction conditions and the performance requirements. Guidelines and a check list can be found in Tables 1 and 2 to help select the most suitable primer.

A representative sample of primer to be used should be tested for quality before delivery to the job-site. A one litre sample of RC-30 and MTC Primer is required, and a four litre sample of EAP is required for testing. Allow three weeks for testing.

6.0 CHECKING THE EQUIPMENT

Before work begins, the distributor, spreader, rollers and brooms, should be examined to make sure they are in good working order.

6.1 The Distributor

The surface treatment distributor consists of an insulated tank mounted on a truck body, an asphalt pump and a spray bar mounted at the rear of the tank. Primer flows from the tank into the pump which pressurizes the spray bar.

Before spraying the distributor must be properly set up so that the primer can be applied within ± 5% accuracy in a continuous and uniform manner both longitudinally and across the spray bar.

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[1]Class 4 Aggregate is referred to as sand cover in MTC Form 302, dated March 1982.

[2]EAP, Emulsified Asphalt Primer.

The first check to make on the distributor spray bar is the condition of the nozzles. All the spray nozzles must be removed from the spray bar, cleaned and examined. Check each nozzle for nicks or damage at the slot opening. Next check that all the nozzles are the same make and same size. Nozzles that are damaged or of different makes or sizes must be replaced with proper nozzles.

The second check to make on the spray bar is to ensure that all the nozzles are set at the correct angle. Each nozzle must be installed so that the slot forms an angle of 15° to 30° with the axis of the spray bar. All the nozzles must be installed at the same angle.

The final check to make on the distributor is the spray bar height. The spray bar must be set at the correct height above the road so that a precise double or triple lap occurs. To check that a precise double lap is set, connect every second nozzle (only a small portion of the spray bar need be used). Spray from the connected nozzles. When the correct height for a double lap is achieved, the spray fans will just appear to touch at the road surface. To check for a precise triple lap, connect and spray from every third nozzle leaving two nozzles in between disconnected. When the correct height for a triple lap is achieved the fans will appear to touch at the road surface. The spray bar must be raised or lowered so that a precise double or triple lap occurs. A triple lap is slightly better than a double lap.

6.2 The Aggregate Spreader

The spreader is a self-propelled unit capable of spreading a uniform curtain of aggregate on the road. Aggregate is dumped into the rear hopper and moved by two conveyor belts to the front hopper where it flows through metering gates onto the road. A hitch connects the spreader to the truck and the spreader pulls the truck.

The spread roller at the bottom of the front hopper should be checked to ensure that it is turning true. The spread roller is hollow and is easily bent when the hopper is removed for transit. To check for trueness, have the operator engage the spread roller with the front hopper empty, and hold a pencil close to the centre

of the roller as it turns. It is helpful to steady the pencil by resting it against something solid. A spread roller with more than 3 mm of wobble can cause washboard and must be repaired before using.

6.3 Rollers

Pneumatic-tired and tandem steel-tired rollers are the most common types used for grade preparation and priming. Rollers should be ballasted and weighed before commencing work. The steel-tired roller must weight at least 7 tonnes and the pneumatic-tired roller at least 8 tonnes. A vibratory roller is permitted providing the drum width is at least 1.25 m.

The tire pressure of the pneumatic-tire roller must be a minimum of 350 kPa cold.

6.4 The Power Broom

The rotary power-broom must be in good mechanical condition and capable of thoroughly cleaning the road surface. Check the broom for excessive bristle wear and mechanical condition before work commences.

7.0 CHECKING APPLICATION RATES

The application rates of primer and aggregate (see Table 4 for suggested rates) should be checked before the job begins using the trial area method, and when the work is underway using the average daily application rate method.

Imperial units are used when calculating the primer application rates in the trial area because the distributors are calibrated to spray in gallons. Metric units are used in all other calculations. Table 3 provides a handy reference to convert primer rates from kg/m^2 to gal./sq. yd.

7.1 The Trial Area

The trial area is one method of checking the application rates of primer and aggregate at the beginning of a project.

A section of road (1000 feet) should be accurately measured with a tape. The contents of the tank are measured with a dip stick before spraying, on a level section of road and then the measured area is sprayed at the predetermined rate. See Table 4 for general application rates. After spraying, the contents of the tank are measured again with the dip stick on a level section of road. The primer application rate in the trial area is calculated by dividing the gallons sprayed by the area in sq. yds.

The process is repeated until the desired application rate is obtained.

Example of trial area calculations for primer:

Length of trial area	1000 ft.
Width of trial area	11 ft.
Contents of tank before spraying	2910 gal.
Contents of tank after spraying	2460 gal.
Used	450 gal.

Area $\frac{1000 \times 11}{9} = 1,222.2$ sq. yds.

Primer application rate $\frac{450}{1,222.2} = 0.368$ gal./sq.yd.

The equivalent primer rate, 1.90 kg/m^2 is found opposite 0.368 gal./sq. yd. in Table 3.

The aggregate application rate is calculated by measuring the distance that the truck load covers with a tape and dividing the kg applied by the area covered in m^2.

Example of trial area calculation for Class 4 Aggregate:

Length covered by load	369 m
Width	3.35 m
Aggregate placed	13.61 t

Area $369 \times 3.35 = 1,236.15$ m^2

Aggregate application rate $\frac{13.61 \times 1000}{1236.15} = 11.0$ kg/m^2

7.2 Average Daily Application Rates

After each day of priming, the average application rates of primer and aggregate should be calculated. The quantity of primer is obtained from the Bill of Lading accompanying each tanker load of primer and any primer not sprayed is subtracted from the Bill of Lading total. Obtain the tonnes[1] of Class 4 Aggregate applied by adding the weigh tickets for that day. Measure the width of the prime with a tape. Using your car odometer, measure the length of the prime completed in km, to the nearest 0.01 km. Be sure to include the area of side roads in your calculations.

Example of daily application rate calculations for primer and aggregate:

Length completed	9.55 km
Width	6.71 m
Primer used	120,700 kg
Aggregate used	704.90 t

Area $9.55 \times 1000 \times 6.71 = 64{,}080.5\ m^2$

Average primer application rate $\dfrac{120{,}700}{64{,}080.5} = 1.88\ kg/m^2$

Average aggregate application rate $\dfrac{704.90 \times 1000}{64{,}080.5} = 11.00\ kg/m^2$

These average application rates are compared to the desired application rates and adjusted accordingly. Refer to Table 4 for the suggested application rates.

8.0 THE PRIMING OPERATION

The priming operations consists of spraying primer on the prepared granular base, waiting 20 minutes to allow the primer to soak in, spreading the aggregate and rolling the aggregate.

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[1] When volume measurements (m^3) are used the density of Class 4 aggregate is 1602 kg/m^3, ie: 75 m^3 = 75 x 1602 = 120,150 kg.

8.1 Spraying the Primer

The primer is sprayed with the distributor at the predetermined rate, see Table 4. The application temperatures should be 30-45°C for RC-30 and MTC Primer and 50-60°C for EAP. The distributor should not exceed 100 m/min while spraying.

During spraying watch the spray bar for blocked nozzles. Nozzles that continually plug up indicate that the strainers in the fill line and pump discharge line require removal and cleaning.

Spraying should proceed towards the aggregate source to prevent the trucks from hauling over the fresh prime. Traffic must be kept off of the uncovered prime.

8.2 Spreading the Aggregate

After a waiting period of 20-30 minutes, to allow the primer to soak into the granular base, class 4 aggregate is uniformly applied with the spreader at the application rate suggested in Table 4. Any areas not satisfactorily covered must be re-treated to prevent damage to the prime.

When the desired application rate is achieved, a small device, the stop block, on the gate opening lever, should be used to maintain this setting.

The aggregate trucks should never be permitted to turn around on the fresh prime and aggregate.

8.3 Rolling

After spreading the aggregate, and before traffic is permitted, rolling with a pneumatic tire roller should commence. The entire area covered should receive at least two passes of the roller and all rolling should be completed by 7 pm each day.

8.4 Longitudinal Joint

The longitudinal centreline joint between the two lanes should be carefully constructed so that excessive overlap does not occur or that a narrow strip of granular base is left without primer. To construct the centreline joint, spray the first lane and spread the class 4 aggregate (after allowing the primer to soak in) 10 cm narrower at centreline. This results in a temporary strip of primer along centreline without aggregate. When the adjacent lane is sprayed, the distributor operator re-sprays the 10 cm strip and aggregate is applied over the exposed primer, after the 20 minute waiting period.

The prime in both lanes should terminate in the same place when work ends for the day. If one lane is primed further than the other, it may be difficult to grade the unprimed lane when work resumes.

8.5 Priming Intersections

Intersections can be primed with the distributor providing a roll of building paper or heavy butcher paper is used to prevent excessive overlapping onto the main road. An intersection consists of two roads intersecting, a major road and a minor road. The priming operation normally proceeds along the major road towards the intersection. Stop the operation on the major road about 20 m from the intersection. Before spraying the minor road, spread the paper along the major road so that overlap on the major road does not occur. Start spraying on the minor road in the lane nearest the stop sign to minimize overlapping and reduce the possibility of flushing from cars applying their brakes. When the primer has soaked in, spread and roll the aggregate. Remove and dispose of the paper when the minor road(s) are completed. Resume priming on the major road as though the intersection was not there.

8.6 Traffic Control

Traffic, including construction traffic, should not be allowed on the primed surface for at least one hour after rolling to prevent damage to the surface. If the road cannot be closed, flagmen and a pilot vehicle on which a sign is mounted should convoy traffic through the work. The maximum speed of the traffic convoy should be 50 km/h for a period of two hours after rolling.

8.7 On-Site Sampling of Primer

It is suggested that a 1-litre sample of RC-30 or MTC Primer be taken per tanker. Metal cans with triple tight lids are satisfactory containers. One, 4-litre sample of EAP from each tanker load is required. The containers for EAP can be plastic lined metal pails or wide-mouth plastic jars. Samples should be taken from tanker before loading into the distributor. Samples should be shipped daily to the testing laboratory and tested immediately.

9.0 APPENDIX

9.1 MTC Form 302

This guide was prepared using MTC Form 302, dated March, 1982. For more detailed information refer to Form 302.

9.2 Primer Guidelines

	Restrictions	Guidelines	Precautions
(a) Resistance to Flushing	With high air temperature (eg > 30°C) and heavy truck traffic, RC-30 and E.A. primers are good while MTC Primer is rated inferior.	Determine Traffic volume and type of temperature encountered, then select appropriate primers.	Flushed surface is a dangerous surface for traffic in wet conditions.
(b) Storage (1)	Since E.A. primer contains water, its storage should not be allowed under temperature below 4°C.	For over-the-winter storage and/or if there is a risk of freezing in late Fall, MTC Primer or RC-30 should be used.	E.A. primer should not be mixed with anionic emulsion (e.g.HF-150S) or with MTC Primer or RC-30.
(2)	The maximum storage time for MTC Primer and RC-30 is 180 days whereas it is only 14 days for E.A. primer.	Schedule work so that primers are used as soon as they are delivered, and minimize storage.	Do not exceed recommended storage time.
(c) Curing (1)	All three primers require about 5 days curing time when temperatures are above 22°C. When weather conditions are less favourable, curing takes longer, especially for MTC primer.	Schedule work to allow sufficient time for curing to achieve good aggregate retention.	Cooler temperature and/or high humidity require longer curing time. Under-cured primers may lead to bleeding and tracking of surface treatments.
(2)	Spraying primers is not recommended if rain is expected within 6 hrs. for RC-30 and E.A., and with 24 hrs. for MTC primer.	Select suitable primer for the appropriate application conditions.	Initial curing governs adhesion of binder to aggregate and resistance to stripping and 'wash off' from sudden wet weather after application.
(d) Reheating	The maximum number of reheating cycle(s) is five (5) for MTC Primer and RC-30 but is only one (1) for E.A. primer.	Avoid reheating and, if reheating is required, ensure it is not to exceed recommended temperature.	For all three types of primers, care should be exercised to prevent any hazards such as fire and/or explosion. Circulation of primers is necessary during reheating.

TABLE 1: PRIMER GUIDELINES

9.3 Primer Checklist

CONDITIONS	PRIMERS		
	M.T.C.	RC-30	E.A.
a) Traffic (S.A.D.T.):			
1) > 250 with S.T.	x	x	x
2) > 250 without S.T.		x	x
3) Truck haul route		x	x
b) Storage:			
1) Conditions - possible freezing (<4°C)	x	x	
2) Time - < 14 days	x	x	x
3) Time - > 14 days (max. 6 months)	x	x	
c) Curing:			
1) Dry/normal	x	x	x
2) Resistenace to wash-off (wet weather after application)		x	x
d) Reheating:			
1) Max. 1 cycle	x	x	x
2) Max. 5 cycles	x	x	

Note: x - Suitable

Ordering

Primers shall be procured competitively in acordance with the approved Designated Sources List, with the most economic product (MTC, RC-30, or EA) being purchased. If, for specific project requirements any of the three approved products is not acceptable, the purchase requisitioning authority must detail reasons (based on these guidelines) and obtain appropriate authorizing signatures on the purchase requisition in accordance with Directive Administration General A-4 relative to a selective purchase.

TABLE 2: PRIMER CHECKLIST

TABLE 3: KILOGRAMS (GAL) OF PRIMER AND EMULSIFIED PRIMER PER KILOMETRE

kg/m²	GAL/SQ.YD.	WIDTH, FEET (m)							
		9(2.743)		10(3.048)		11(3.353)		12(3.658)	
		kg	GAL.	kg	GAL.	kg	GAL.	kg	GAL.
0.80	.155	2194	509	2438	565	2682	622	2926	678
0.85	.165	2332	541	2591	602	2850	662	3109	722
0.90	.174	2469	571	2743	634	3018	698	3292	761
0.95	.184	2606	604	2896	671	3185	738	3475	805
1.00	.194	2743	637	3048	707	3353	778	3658	849
1.05	.203	2880	666	3200	740	3521	814	3841	888
1.10	.213	3017	699	3353	776	3688	854	4024	932
1.15	.223	3154	732	3505	813	3856	894	4207	976
1.20	.232	3292	761	3658	846	4024	930	4390	1015
1.25	.242	3429	794	3810	882	4191	970	4573	1059
1.30	.252	3566	827	3962	919	4359	1011	4755	1102
1.35	.261	3703	856	4115	951	4527	1047	4938	1142
1.40	.271	3840	889	4267	988	4694	1087	5121	1186
1.45	.281	3977	922	4420	1024	4862	1127	5304	1229
1.50	.290	4115	951	4572	1057	5030	1163	5487	1269
1.55	.300	4252	984	4724	1094	5197	1203	5670	1312
1.60	.310	4389	1017	4877	1130	5365	1243	5853	1356
1.65	.319	4526	1047	5029	1163	5532	1279	6036	1395
1.70	.329	4663	1079	5182	1199	5700	1319	6219	1439
1.75	.339	4800	1112	5334	1236	5868	1359	6402	1483
1.80	.348	4937	1142	5486	1269	6035	1395	6584	1522
1.85	.358	5075	1175	5639	1305	6203	1436	6767	1566
1.90	.368	5212	1207	5791	1342	6371	1476	6950	1610
1.95	.378	5349	1240	5944	1378	6538	1516	7133	1654
2.00	.387	5486	1270	6096	1411	6706	1552	7316	1693
2.05	.397	5623	1303	6248	1447	6874	1592	7499	1737
2.10	.407	5760	1335	6401	1484	7041	1632	7682	1780
2.15	.416	5897	1365	6553	1517	7209	1668	7865	1820
2.20	.426	6035	1398	6706	1553	7377	1708	8048	1864
2.25	.436	6172	1430	6858	1589	7544	1748	8231	1907
2.30	.445	6309	1460	7010	1622	7712	1784	8413	1947
2.35	.455	6446	1493	7163	1659	7880	1825	8596	1990
2.40	.465	6583	1526	7315	1695	8047	1865	8779	2034
2.45	.474	6720	1555	7468	1728	8215	1901	8962	2074
2.50	.484	6858	1588	7620	1764	8383	1941	9145	2117
2.55	.494	6995	1621	7772	1801	8550	1981	9328	2161
2.60	.503	7132	1650	7925	1834	8718	2017	9511	2200
2.65	.513	7269	1683	8077	1870	8885	2057	9694	2244
2.70	.523	7406	1716	8230	1907	9053	2097	9877	2288
2.75	.532	7543	1745	8382	1939	9221	2133	10060	2327
2.80	.542	7680	1778	8534	1976	9388	2173	10242	2371
2.85	.552	7818	1811	8687	2012	9556	2214	10425	2415
2.90	.561	7955	1841	8839	2045	9724	2250	10608	2454
2.95	.571	8092	1873	8992	2082	9891	2290	10791	2498
3.00	.581	8229	1906	9144	2118	10059	2330	10974	2542
3.05	.591	8366	1939	9296	2154	10227	2370	11157	2585
3.10	.600	8503	1969	9449	2187	10394	2406	11340	2625
3.15	.610	8640	2001	9601	2224	10562	2446	11523	2668
3.20	.620	8778	2034	9754	2260	10730	2486	11706	2712
3.25	.629	8915	2064	9906	2293	10897	2522	11889	2752
3.30	.639	9052	2097	10058	2329	11065	2562	12071	2795
3.35	.649	9189	2129	10211	2366	11233	2603	12254	2839
3.40	.658	9326	2159	10363	2399	11400	2639	12437	2878
3.45	.668	9463	2192	10516	2435	11568	2679	12620	2922
3.50	.678	9601	2224	10668	2472	11736	2719	12803	2966
3.55	.687	9738	2254	10820	2504	11903	2755	12986	3005
3.60	.697	9875	2287	10973	2541	12071	2795	13169	3049
3.65	.707	10012	2320	11125	2577	12238	2835	13352	3093
3.70	.716	10149	2349	11278	2610	12406	2871	13535	3132
3.75	.726	10286	2382	11430	2647	12574	2911	13718	3176
3.80	.736	10423	2415	11582	2683	12741	2951	13900	3220

Notes:

1. The table is based on a bulk relative density of 0.95 at 15°C.
2. The units kg/m^2 and L/m^2 are not directly interchangeable, ie. 1.80 kg/m^2 ÷ 0.95= 1.90 L/m^2.
3. The units kg and L are not directly interchangeable, ie. 4937 kg ÷ 0.95 = 5197 L.
4. 1 tonne = 1000 kg.

9.5 Recommended Primer Application Rates

TYPE OF SURFACE TREATMENT	APPLICATION RATES				A A D T			
	Primer or Binder		Aggregate		Existing Road Surface			
	Grade	kg/m^2	Type	kg/m^2	Gravel	Prime	Surface Treatment	Pavement
Prime	Primer	± 1.90	Class 4[1]	10.0-12.0	< 200	-	-	-
Single Surface Treatment	CRS-1 CRS-2 RS-2	1.65-1.90 or Design	Class 1	12.0-14.0 or Design	-	< 500	< 2000	< 4000
	HF-100S	1.30-1.50	Class 2	16.5-19.0	-	< 1000	< 2000	< 4000
	HF-150S	1.35-1.55	Class 2	16.5-19.0	-	< 500	< 1000	< 2000
	HF-250S	1.35-1.55	Class 2	16.5-19.0	-	< 200	< 400	< 700
Double Surface Treatment	CRS-2 RS-2 HF-100S	1.60-1.70	Class 3[2]	15.0-17.5	-	< 1000	< 2000	< 4000
		1.05-1.15	Class 4[1]	6.5- 8.0				

NOTES:

1. Class 4 - Aggregate is referred to as sand cover in MTC Form 302 and as sand seal in MTC Form 303.
2. Class 3 - Aggregate is referred to as coarse aggregate in MTC Form 303.

TABLE 4: RECOMMENDED PRIMER APPLICATION RATES